

AMENDMENTS TO THE CLAIMS

1. (Previously Presented) A method to fill a metal in fine grooves formed in a surface of a substrate, comprising:

bringing the substrate into contact with a plating solution;

plating the substrate with the plating solution electrically with an electric current to form a plated metal film;

stopping the electric current to interrupt said plating before the plated metal film reaches a desired film thickness;

etching the plated metal film electrolytically with a direct electric current opposite to the electric current during plating;

after said etching, bringing the substrate into contact with a processing liquid offering surface activity of a surface of the substrate; and

plating the substrate having the etched metal film to form a remaining film thickness to reach the desired film thickness.

2. (Previously Presented) A method according to claim 1, wherein a current density of the direct electric current during said etching is in a range of 1 mA/cm² to 30 mA/cm².

3. (Previously Presented) A method according to claim 1, wherein the direct electric current for performing said etching is supplied for a period of time in a range of about 0.5 seconds to 30 seconds.

4. (Previously Presented) A method according to claim 1, wherein the metal is copper.

5. (Previously Presented) A method according to claim 1, wherein said etching is performed with the plating solution.

6. (Previously Presented) A method according to claim 1, wherein said plating of the substrate having the etched metal film is performed with the plating solution.

7. (Previously Presented) A method of plating a substrate with copper, comprising:
bringing a substrate into contact with a processing liquid offering surface activity of a substrate surface and/or increasing wettability between a plating solution and a surface of the substrate;
performing at least one of removing the processing liquid from the substrate and drying the substrate; and
bringing the substrate into contact with the plating solution to plate the substrate after performing said at least one of removing the processing liquid from the substrate and drying the substrate.

8. (Previously Presented) A method according to claim 7, wherein said performing at least one of removing the processing liquid from the substrate and drying the substrate includes one of rotating the substrate to spin off the processing liquid from the substrate, rotating the substrate and applying a gas blow to the substrate, and passing the substrate through forced air.

9. (Previously Presented) A method according to claim 7, wherein said performing at least one of removing the processing liquid from the substrate and drying the substrate comprises successively removing the processing liquid from the substrate and drying the substrate using only one apparatus after the substrate is brought into contact with the processing liquid .

10. (Previously Presented) A method according to claim 1, wherein said bringing the substrate into contact with the processing liquid comprises repeatedly bringing the substrate into contact with the processing liquid.

11. (Previously Presented) A method according to claim 1, wherein said bringing the substrate into contact with the processing liquid is performed prior to or during said plating the substrate having the etched metal film.

12. (Previously Presented) A method according to claim 1, wherein said bringing the substrate into contact with the processing liquid comprises bringing the substrate into contact with a processing liquid containing at least one of an organic substance and a sulfur compound.

13. (Previously Presented) A method according to claim 7, wherein said bringing the substrate into contact with the processing liquid comprises repeatedly bringing the substrate into contact with the processing liquid.

14. (Currently Amended) A method according to claim ~~1~~ 7, wherein said bringing the substrate into contact with the processing liquid comprises bringing the substrate into contact with a processing liquid containing at least one of an organic substance and a sulfur compound.